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7 October 1965

MEMORANDUM FOR SELF:

1. Meeting with [redacted] this date S
in reference to the Processor Development Program, Sepratron, and Chip Processor revealed the following:

A. Ship chip processor to [redacted] for perfor- S
mance evaluation.

B. At completion of performance evaluation, or when practical convert to a sensitometric processor for use in the Processor Development Program (PDP).

C. Buy an EG&G Sensitometer for use in the PDP and follow-on Clean Room work.

D. Find a legal method of getting rid of the HTA-5 Processor.

STAT 2. [redacted] is going to send in a proposal for testing and evaluating new equipment in the Clean Room. (1 year use)

3. ~~Synatron~~ Sepratron - look into

A. Color

B. Controlled Development

C. ON Processing

D. Thin Base

E. Crash Program

STAT

[redacted] meeting - No indication of [redacted] this picking up the Processor Dev. Program. S
He will look into Westover + SAC requirements for equipment evaluation requirements.
clc Proposal by Ivan covered by [redacted] efforts - SPSE Journal report 12-14 months ago.
STAT

Declass Review by NIMA/DOD

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STAT

FILM USED IN PSD

Roll Film - 8430 & 5427

70mm - 210,000 ft. used July '64 thru March '65 (9 mo.)
= 262,500 ft./yr. = 525 rolls of 500' material
= 21,875 ft./mo.

9½" - 76,500 ft. used July '64 thru March '65 (9 mo.)
= 95,625 ft./yr. = 191 rolls of 500' material
= 8,051 ft./mo.

Total = 358,125'

S

STAT 500' roll 9½ = [redacted] w/o
70mm = 44.00 Processing

STAT Estimate [redacted] /roll - print & process & handling

525 rolls of 70m [redacted] S

191 rolls of 9½"

STAT 500 [redacted]

500

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25X1

REPORT ON AIR SAMPLING AT [redacted] STAT

On 8-13-65 the [redacted] Clean Room Complex at [redacted] was sampled. STAT STAT STAT

A [redacted] electronic particle counter was used for this air sampling. [redacted] had been calibrated on 7-15-65 and was operated by [redacted] STAT STAT STAT

Test Procedures

The [redacted] was programmed to count .5 microns or larger and 5 microns or larger. Each air inlet was sampled for at least ten to fifteen minutes to determine the particulate coming into the room. All of the inlets in each of the four individual rooms were producing air that met Federal Standard 209, Class 100 requirements. The average count taken was approximately 85 particles per cubic foot of air .5 microns or larger. STAT

We hereby certify that all tests were conducted in accordance with [redacted] prescribed procedures. STAT

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REPORT ON AIR SAMPLING AT [redacted] STAT

On 8-13-65 the [redacted] Clean Room Complex STAT
STAT [redacted]

STAT [redacted] electronic particle counter was used for STAT
STAT this air sampling. [redacted] had been calibrated on
7-15-65 and was operated by [redacted]

Test Procedures

STAT The [redacted] was programmed to count .5 microns or larger and 5 microns or larger. Each air inlet was sampled for at least ten to fifteen minutes to determine the particulate coming into the room. All of the inlets in each of the four individual rooms were producing air that met Federal Standard 209, Class 100 requirements. The average count taken was approximately 85 particles per cubic foot of air .5 microns or larger.

We hereby certify that all tests were conducted in accordance
STAT with [redacted] prescribed procedures.

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REPORT ON AIR SAMPLING AT [redacted] STAT

On 8-13-65 the [redacted] Clean Room Complex STAT

STAT [redacted]

STAT A [redacted] electronic particle counter was used for STAT
STAT this air sampling. [redacted] had been calibrated on
7-15-65 and was operated by [redacted]

Test Procedures

STAT The [redacted] was programmed to count .5 microns or larger and 5 microns or larger. Each air inlet was sampled for at least ten to fifteen minutes to determine the particulate coming into the room. All of the inlets in each of the four individual rooms were producing air that met Federal Standard 209, Class 100 requirements. The average count taken was approximately 85 particles per cubic foot of air .5 microns or larger.

We hereby certify that all tests were conducted in accordance
STAT with [redacted] prescribed procedures.

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REPORT ON AIR SAMPLING AT [ ] STAT

On 8-13-65 the [ ] Clean Room Complex STAT
[ ] STAT

STAT A [ ] electronic particle counter was used for STAT
this air sampling. The [ ] had been calibrated on
7-15-65 and was operated by [ ]

Test Procedures

STAT The [ ] was programmed to count .5 microns or larger and 5 microns or larger. Each air inlet was sampled for at least ten to fifteen minutes to determine the particulate coming into the room. All of the inlets in each of the four individual rooms were producing air that met Federal Standard 209, Class 100 requirements. The average count taken was approximately 85 particles per cubic foot of air .5 microns or larger.

We hereby certify that all tests were conducted in accordance
STAT with [ ] prescribed procedures.

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99760

PROPOSAL FOR AN ANALYTICAL STUDY TO DETERMINE THE EFFECT OF CONTAMINATION ON PHOTOGRAPHIC IMAGE QUALITY AND INTERPRETATION

September 1965

STAT

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ANALYTICAL STUDY TO DETERMINE THE EFFECT OF CONTAMINATION ON IMAGE QUALITY AND PHOTOGRAPHIC INTERPRETATION

1. The processing of original negative film necessitates extreme care in the mechanical handling of the silver halide emulsion, and also the elimination of contaminate (foreign) particles from the processing environment, if maximum image quality is to be achieved. The prime purpose of photography is interpretation of the image, if development is performed in a contaminated atmosphere, inevitably a degraded negative results. In this program, it is planned to develop a computerized mathematical model which will predict the quality of the image in quantized form, given certain factors describing the image, the film, and the contaminants.

2. At the present time little or no data are available to procurement agencies and to designers of armed services photographic laboratories on which to base a "cleanliness" requirement. One result of this mathematical model is the evaluation of the differences between "black, gray, white" and various degrees of "clean" photographic processing rooms as judged by the quality and interpretability of the image produced in them. Considerable dollar savings may be achieved, if step-downs in the degree of "cleanliness" of an environment result in none, or little image quality degradation or minimal image misinterpretation. Thus, this program will determine the degree of parametric minimal environmental cleanliness required for any specific degree of image quality.

3. The newly installed class 100 clean room complex at [redacted] STAT is an essential tool for the conducting of this program. STAT Control will be exercised over the contaminant parameters and observations made of the resultant image quality and readability.

4. The mathematical model will be developed as follows:

$$\hat{q} = \hat{A}a + \hat{B}b + \hat{E}e + \hat{F}f + \hat{G}g + \hat{H}h + \hat{S}s + \hat{T}t.$$

q = 0-----10 representing a subjective measure of image quality.

Each image will be judged by 10 service-trained photographic interpreters, on a scale from 0 (indicating utter confusion) through 10 (indicating perfect reading). To obtain a uniform

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standard of judgement among the interpreters, a short training period will be necessary on pilot negatives.

5. The following designates will be given:

a = 0, 1, 2, 3 representing none, slight, moderate and excessive aerosol contamination per unit area.

b = 1------10 representing background (type of terrain). A suitable coding system must be developed for this function, such that 1 represents the lightest, or whitest, background, for example, desert under sun, whereas 10 represents the darkest or blackest background, for example, forest under overcast.

c = 0, 1, 2, 3 to represent four commonly used emulsions.

f = 0, 1, 2, 3 representing none, slight, moderate and excessive fluid contaminate per unit area.

g = 1, 2, 3 representing minimum, normal and maximum average grain size.

h = 0, 1, 2, 3, 4 representing low to high camera height above terrain.

s = 1, 2, 3 representing small, moderate and large size of contaminate particles.

t = 0, 1, 2 will represent three different types, or shapes, of contaminate particle to be determined.

The capital letters are coefficients to be estimated by the least squares method. When estimated by computer these coefficients will form the "blue" or best linear unbiased estimate of $\hat{q}$ image quality q for given readings of the eight factors a, b, c, f, g, h, s and t.

6. Other numerical results forthcoming from the program will be the following:

1) The accuracy of the estimate, $\hat{q}$, of image quality, q, will be given in the form of 95 percent confidence limits of $\underline{q}$ and $\bar{q}$ That is to say, "if a thousand experiments were performed on different populations and everyone of them produced exactly the same results, then, on an average 950 of the experimenters

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would be correct in assuming that the curve q for a given set of factors is between $\underline{q}$ and $\bar{q}$. The outstanding 50 experimenters would be in error.

2) The "ANOVA," or analysis of variance, will provide information as to whether a significant difference in q does, or does not, exist due to changes in each factor a, b, etc. If it is discovered that any particle factor does not affect quality (for instance, it is conceivable that particle type, t, may have no effect), the model may be simplified by the omission of that factor and its coefficient in upper case (T).

3) It is anticipated that significant interactions between factors will be discovered. Thus, possibly for large values of h, small values of s may be degrading, whereas for small h, even a large size of s may not be degrading. If so, then in this example, the h-s interaction would be of significance.

7. STAT Program BMD02R and BMD02V from BMD. [redacted] STAT [redacted] January 1964 will be used.

8. The study will be a complete replicate of a 4 x 10 x 4 x 4 x 3 x 5 x 3 x 3 (36,480) cell experiment with 10 observations (representing the 10 interpreters) in each cell. The within-cell variance with 9 x 86,400 (777,600) degrees of freedom is a highly satisfactory denominator for the classical F-test of significance.

9. The program as summarized in the chart on Fig. 1 and detailed in Fig. 2 is further clarified below. The item numbers also refer to the balloon numbering on Fig. 2.

Item 1. Classify contaminates according to

s = 0, 1, 2, 3 and t = 0, 1, 2.

Item 2. Classify contaminates into a = 0, 1, 2, 3 and f = 0, 1, 2, 3.

Item 3. Classify emulsion and grain size into e = 0, 1, 2, 3 and g = 1, 2, 3.

Item 4. Accurately define background and height into b = 1, ---------10, and h = 0, 1, 2, 3, 4.

Item 5. Prepare pilot negatives.

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Item 6. Confer with interpreters and develop uniform scoring system for q = 0------10.

Item 7. Expose all negatives for complete program.

Item 8. Determine methodology for contamination of film samples.

Item 9. Process samples in contaminated environments.

Item 10. Process control samples in clean environment.

Item 11. Read and plot image quality of all samples.

Item 12. Devise suitable form to ease task of interpreters in judging negatives, recording q, and to facilitate card punching.

Item 13. Conduct training program of P.I. personnel.

Item 14. Present negatives in scheduled order to interpreters. This is a major task of the program.

Item 15. Write instructions to computer personnel at computer facility and transmit completed forms to them.

Item 16. Punching of computer cards.

Item 17. Computer processing and printout of results.

Item 18. Receive printout from computer facility.

Item 19. Evaluate computer printout.

Item 20. Write final report.

10. Program Breakdown.

The program as described in this proposal will be divided into 5 distinct phases, as follows:

PHASE 1.

a) Isolate, recognize and classify both aerosol and liquid contaminates into types, shapes, and sizes (Factors s & t).

b) Determine levels of both aerosol and liquid contaminates per unit area (Factors a & f).

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c) In conjunction with project co-ordinator determine emulsions to be used, and group selective grain sizes (Factors e & g).

d) In conjunction with project co-ordinator determine terrains (backgrounds) and effective camera heights (Factors b & h) and determine source for master negatives of these.

e) Determine source and availability of photo interpreters.

f) Prepare pilot negatives.

g) Confer with interpreters and develop uniform scoring system.

PHASE 2.

h) Expose all negatives for complete program.

PHASE 3.

j) Determine methodology for contamination of film samples.

k) Process samples in contaminated environments.

l) Process control samples in clean environments.

m) Read and plot image quality of all samples.

PHASE 4.

n) Devise recording form to enter value judgements of q and to expedite card punching.

o) Conduct training program of P.I. personnel.

p) Conduct subjective evaluation of image samples by Photo Interpreters.

PHASE 5.

r) Prepare instructions and transmit complete forms to computer facility.

s) Punch cards, process, and printout results at computer facility.

t) Receive computer printout, evaluate results.

v) Write final report.

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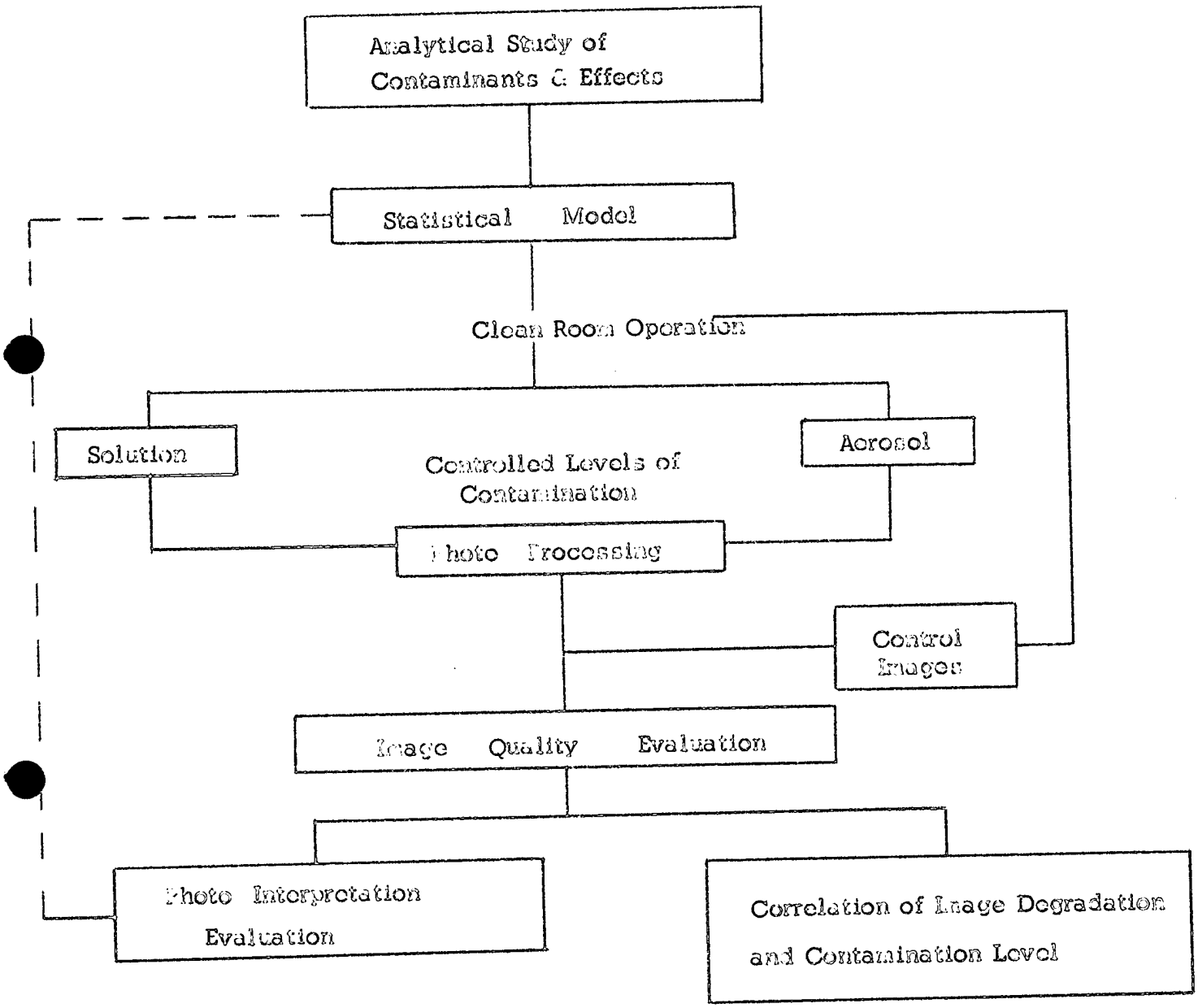
PROPOSED ANALYTICAL STUDY INTO EFFECTS OF CONTAMINATES ON PHOTOGRAPHIC FILM



Program Summary

Fig. 1

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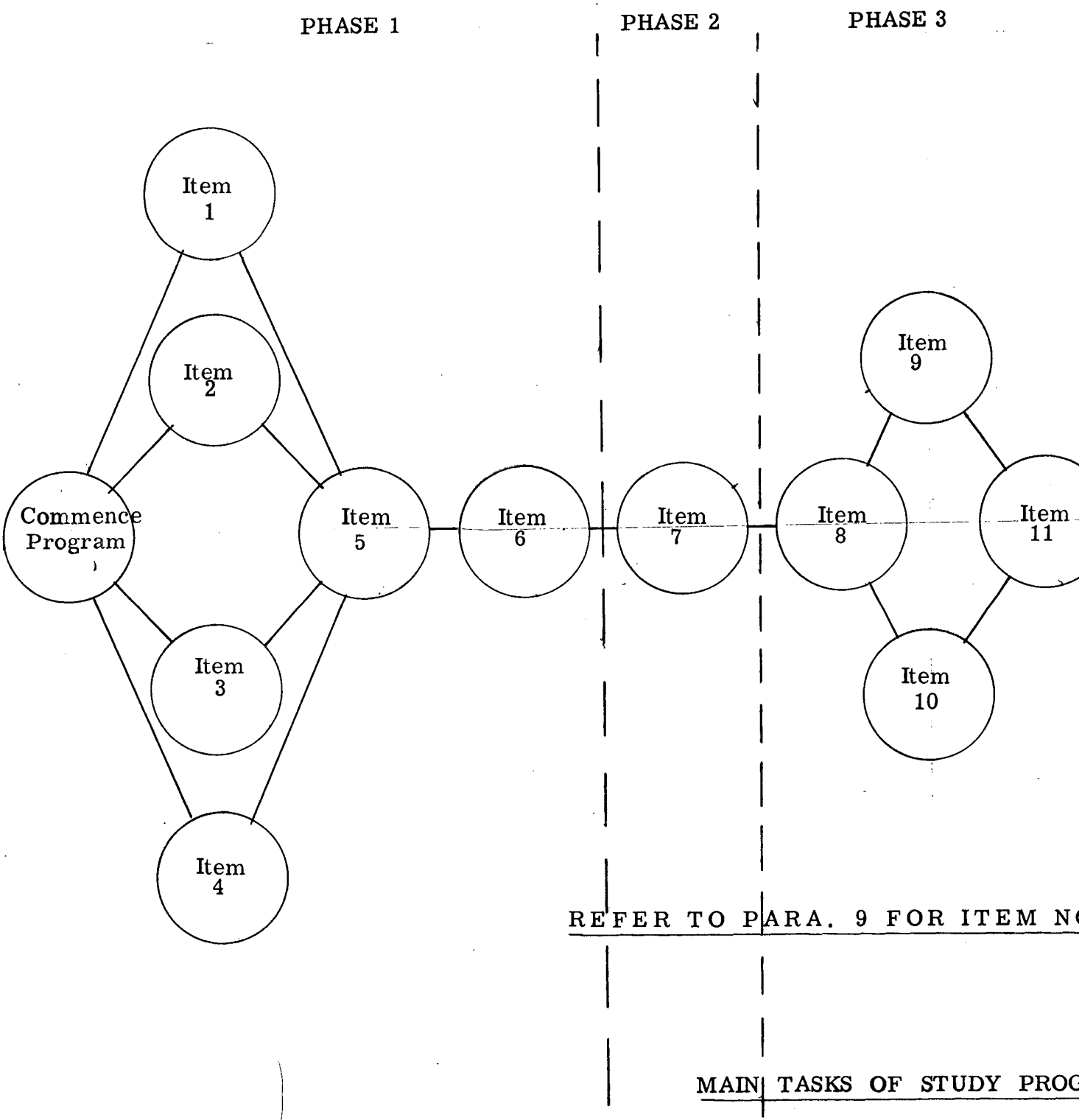

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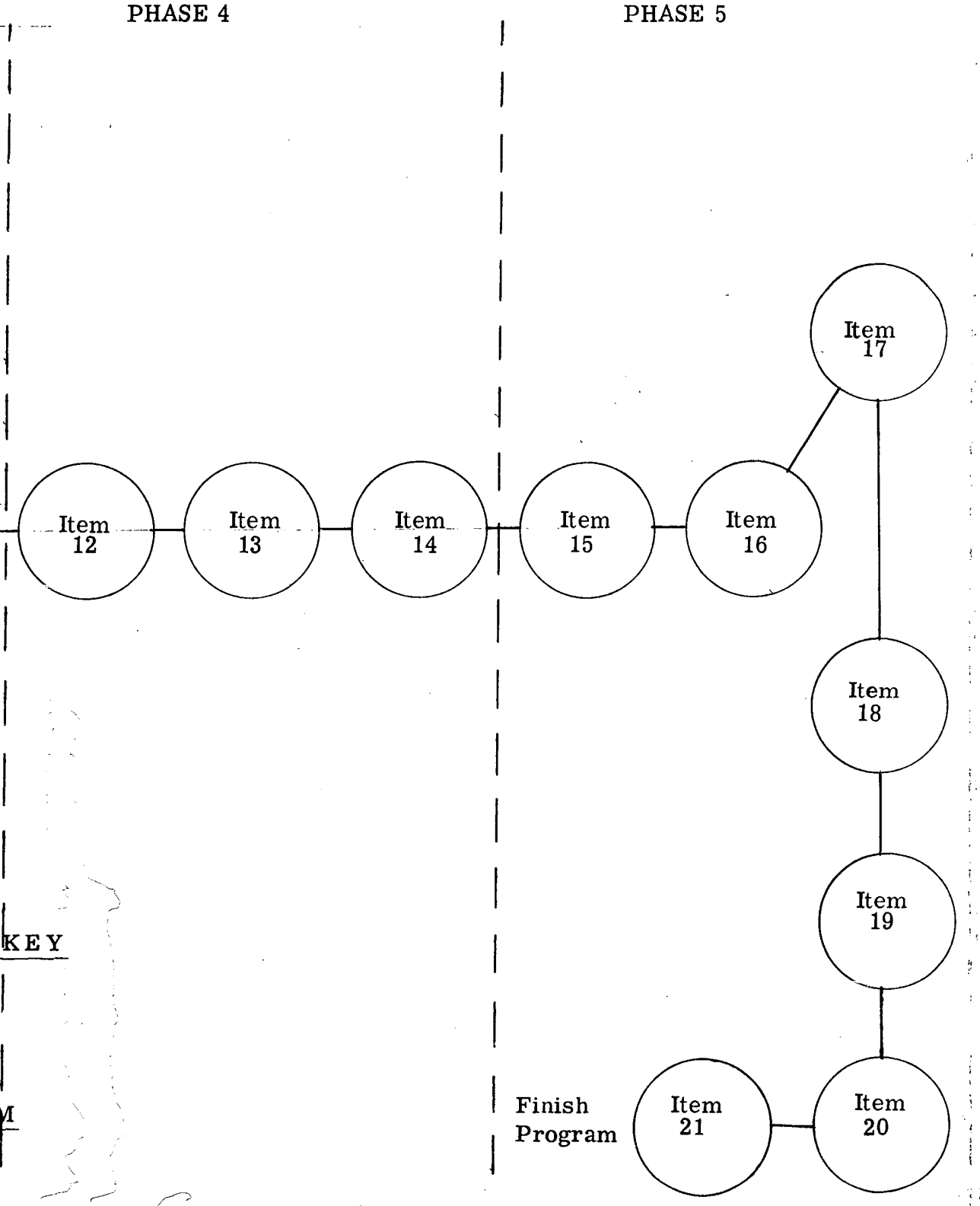

FIG. 2

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15 Sept 65

Telephone conversation - [redacted]

[redacted]

① Clean Room accepted from [redacted]

② Requested letter from [redacted] on Clean Room Contamination Study follow on effort forwarded. In hand.

③ Letter on use of 4x5 processor in clean room program is in the mail.

④ Second Progress report in mail.

⑤ Report on [redacted] (998225) in mail!

⑥ Use of ABD-4 Drier in Clean Room Program coming (Film Drying Program)

⑦ HTA-5 letter out this week.

⑧ Would like to submit a proposal (unsolicited) on dry film processing. Told him to hold off until [redacted]

[redacted]

⑨ Clean Room & equipment testing - report to 3 Sept call - [redacted] has not called back.

[redacted] * Talked to [redacted] who is going to Western tomorrow (16 Sept) He knows [redacted] will talk to him re the surplus equipment - if any - will let me know.

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3 Sept 65

STA

Telephone conversation - [redacted]

AT [redacted]

1. Asked them to look into HTA-5 refurbishing + making operational - within reason + without going thru R+D in those deficient areas.
   Need two weeks to answer this
2. ABD-4 Drier - what use do they intend? Will use it in the additional film drying task levied on them.
3. Chip Processor - Evaluation - chemistry, speed, film emulsions, etc
   Proposal letter - Ship to [redacted] for evaluation - to use in clean-room program. $2500
4. Preparing a Clean Room Study Program - follow-on to current program - 2-2½ year program broken out in 6 month tasks @ [redacted] - [redacted] total effort.
5. Adding film drying experiment + study to present program.

6. Equipment testing facility out of clean room - they need an idea of types of equipment, to be tested, test equipment necessary to do job, etc.
7. [redacted] Westover - spares - particle counters, [redacted] re this -

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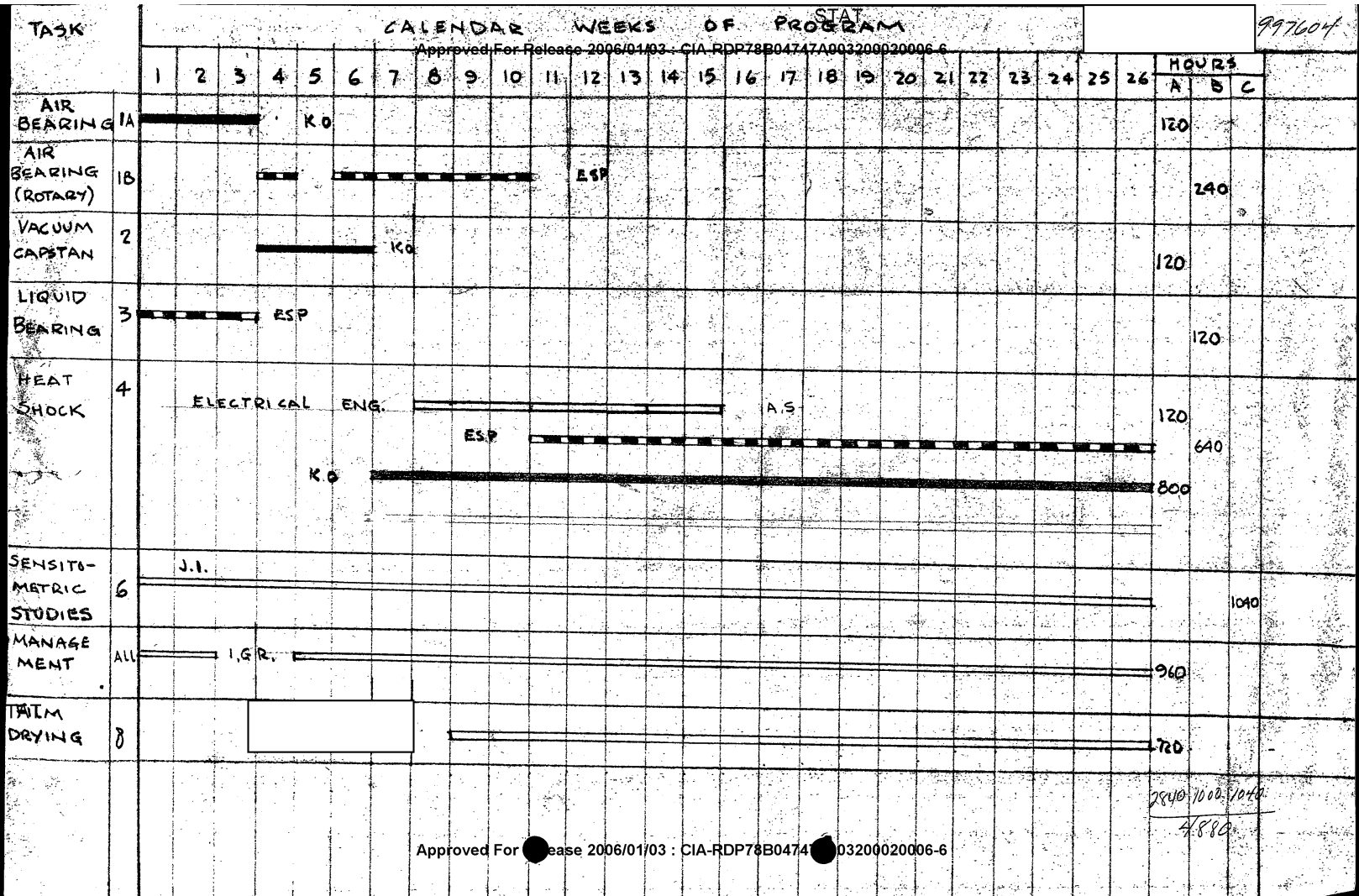

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